

## Dexmedetomidine: A drug for all seasons?

Submitted: 31-Oct-2021

Accepted: 08-Nov-2021

Published: 23-Nov-2021

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Access this article online
Website: <a href="http://www.ijaweb.org">www.ijaweb.org</a>
DOI: 10.4103/ija.ija_964_21
Quick response code


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*A Drug for All Seasons* was the first musical album of the band F5, released in 2005, formed by David Ellefson, American musician, best known for co-founding an earlier musical band, Megadeth. Ellefson formed F5 following Megadeth's 2002 disbandment (resurrected later in 2004, without Ellefson). Anaesthesiology's answer to F5's *A Drug for All Seasons*, in the current practice scenario, would most certainly be dexmedetomidine. The drug has been endorsed by the United States Food and Drug Administration for short-term sedation (<24 h) of intubated and mechanically ventilated adult cases, at first, in the intensive care unit (ICU) and then for sedation of non-intubated cases during operative and other interventions. However, dexmedetomidine is now not only widely used for the above situations in the ICU and in the interventional areas,<sup>[1]</sup> but its anaesthetic utilisation has in fact significantly branched out in the last ten years due to many good biological sequelae to its use in these locations.<sup>[2-4]</sup>

Stability of haemodynamics is one of the most coveted goals in anaesthesia. Sudden changes in haemodynamics can considerably increase the stress levels of non-seasoned anaesthesiologists. Consequently, the quest for the optimal technique to blunt an anticipated haemodynamic perturbation has been a favourite topic of research amongst anaesthesiologists. When it comes to intra-operative haemodynamic stability and enhanced recovery, none can match the efficiency of regional techniques.<sup>[5,6]</sup> Scalp block is an age-old technique introduced for

awake neurosurgical procedures. It has extended its use as an adjunct to general anaesthesia for multitude reasons, such as blunting responses to noxious stimuli, providing haemodynamic stability, decreasing opioid consumption with secondary effects on intracranial pressure and anaesthetic recovery and providing post-operative analgesia.<sup>[7,8]</sup>

The block has also been performed at various time-points during the peri-operative sequence, based on the effect required.<sup>[9]</sup> Preoperative administration after induction of anaesthesia is helpful in providing intraoperative haemodynamic stability and decreasing anaesthetic and opioid consumption, thus improving recovery. Apart from reducing responses to pin fixation it has also been utilised in avoiding rare complications of pinning such as trigeminocardiac reflex.<sup>[10]</sup> Post-surgical administration before extubation has been able to provide prolonged postoperative pain relief with better post-operative haemodynamic control and neurological assessment. Some anaesthesiologists practice repeated administration before and after surgery especially in procedures of prolonged duration to get all the aforementioned benefits.

With the advent of ultrasound, the identification of even the smallest peripheral nerves has become easier. Hence the success rates of scalp blocks have improved.<sup>[11]</sup> Scalp block has facilitated even day-care surgeries for minor neurosurgical procedures including superficial tumour decompressions. Nevertheless, the utility of scalp block as a sole anaesthetic technique is

always overshadowed due to several reasons such as longer duration of surgery, uncomfortable positioning, requirement of multiple injections and difficulty in airway access in case of emergencies.

Hence, research on scalp block has preferentially sided with its use as an anaesthetic adjunct. Addition of adjuvants to local anaesthetics is termed as multimodal perineural analgesia.<sup>[12]</sup> Adding adjuvants in scalp block has been studied for improving block characteristics, decreasing the dose and prolonging the analgesic effect. Dexmedetomidine has been shown to prolong the duration of analgesia of local anaesthetics following infiltration or peripheral nerve blocks by blocking the hyperpolarisation-activated cation current.<sup>[13-15]</sup> This has been found to decrease the potential of neurotoxicity and other tissue toxicity purported to occur due to local anaesthetics. In fact, dexmedetomidine was found to be neuroprotective when combined with bupivacaine for sciatic block.<sup>[16]</sup>

A study published in this issue analyses the utility of adding dexmedetomidine to ropivacaine for blunting haemodynamic response to the noxious stimulus of skull pin placement.<sup>[17]</sup> The article concludes that addition of dexmedetomidine has no effect in blunting such response. This signifies that scalp block when performed in experienced hands is good enough to blunt the haemodynamic response to pin fixation, even without an adjuvant. Also, the success of any block depends on the proximity of drug deposition to the nerve. Addition of an adjuvant can only alter the onset and duration of sensory or motor components of the block. The effect of adding dexmedetomidine in prolonging the duration of analgesia was not a part of outcomes assessed in this particular study. This may be because the study included a heterogenous group of not only cranial but also cervical surgeries requiring pin application. Though dexmedetomidine in doses of 50 to 100 µg as adjuvant in brachial plexus block has been shown to cause a decrease in heart rate, such effect neither occurred during the initial assessment period of 15 min during pin application nor later during the course of surgery in this study. This can be due to different routes of administration having different rates of absorption (i.e., brachial plexus vs scalp layers).

The publication of this study lays emphasis on the candid negative results obtained. Though caution should be followed while interpreting negative results, the study appears to be an honest representation by

the authors. Most negative results are due to similarity in the groups<sup>[18]</sup> but one should rule out adequacy of sample size to ensure that subtle differences aren't missed out. *Post hoc* power analysis is requested by certain editors before the decision of publication of such studies. However, *post hoc* power study as a means of deciphering negative study results has often been frowned upon. As *post hoc* scrutinisation is customarily only done for negative trials ( $P \geq 0.05$ ), such a study will put forth a low *post hoc* power result, which may be misread as the trial not having enough power.

For pragmatic purposes, the current study included cases involving pin fixation in cervical surgeries. In clinical practice, pin fixation can be conveniently managed by local anaesthetic infiltration at the site of pinning.<sup>[19]</sup> Furthermore, scalp block can cause complications such as transient paralysis of the facial nerve and unilateral complete ptosis.<sup>[20,21]</sup> While bilateral scalp block is practised, in supratentorial craniotomies, to provide analgesia in skin and incision sites, selective scalp block and unilateral blocks can be performed when head clamps are not used. Selective blockade of occipital nerve has been utilised in managing post-aneurysmal rupture headache, occipital neuralgia, cervicogenic headache and cluster headache and to decrease the incidence of post-craniotomy chronic pain.<sup>[22]</sup>

The authors ought to be toasted for bringing to the foreground the fact that we cannot expect all treatments to be rewarding, and we then need negative and neutral reports to help us to pin down the most fruitful therapies for those under our care.

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**How to cite this article:** Parida S, Theerth KA. Dexmedetomidine: A drug for all seasons? *Indian J Anaesth* 2021;65:789-91.



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